MOCCA compact 2.3

Document Release

MOCCA compact 2.3

K2L
CONNECTING NETWORKS

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Document History

Version	Brief description of change
V1.0.000	Initial Release
V01.01.00	CAN Breakout cable added; Image of back panel (power/CAN) added; types of LIN and single wire transceiver added

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Tables

1 Safety instructions

1.1 Supply and Synchronisation

The *MOCCA compact 2.3* has the possibility to be cascaded over its Sync/Power connector. To use this opportunity an optional sync cable has to be order.

Caution has to be taken to not exceed the maximum current of 3A the first device in the chain is able to take. Do not cascade more than 8 devices in chain.

For all setups a fuse of max. 4A in the supply cable to the first device or the use of the current limitation of your laboratory power supply is mandatory.

1.2 Relay

The Relay of the device is intended to switch other 12V powered devices. The capability is limited to 5A at 16V maximum. It is recommend to use both clamps for each contact. Always use core cable ends of appropriate length and diameter to prevent unintended connections.

2 Overview

2.1 Using the Documentation

This user manual provides conceptual information about the K2L GmbH MOCCA compact 2.3 and describes its fundamental operation.

2.1.1 Intended Audience

This document is written for end users of K2L products including the MOCCA compact 2.3. To use the MOCCA compact 2.3 environment, your background should include:

♦ Proficiency with the Windows® GUI.
♦ Familiarity with basic features and capabilities of CAN®.
♦ Familiarity with basic features and capabilities of MOST®.
♦ Familiarity with basic features and capabilities of FlexRay®.
♦ Familiarity with the protocols used on all bus systems.

2.1.2 Abbreviations

Term	Description
BM	Line "Bus Minus" in FlexRay
BP	Line "Bus Plus" in FlexRay
CAN	Controller Area Network – automotive bus system
CPU	Central Processing Unit
EHC	External Host Controller
FOT	Fiber Optical Transceiver
FR A/B	FlexRay Channel A and B
HW	Hardware
INIC	Intelligent Network Interface Controller
LAN	Local Area Network
LIN	Local Interconnect Network
MLB	Media Local Bus, an on-PCB or inter-chip communication bus
MOST	Media Oriented Systems Transport
RAM	Random Access Memory
ROM	Read Only Memory
SW	Software
USB	Universal Serial Bus

Table 2-1: Abbreviations

2.2 MOCCA compact 2.3 Overview

K2L MOCCA compact is an out of the box automotive bus interface, aggregating most of the current automotive buses. MOCCA compact is intended to be used as bus interface for PC test and simulation purposes or also as Automotive Bus Converter with an easy to configure gateway between all connected automotive buses.

Due to its PC compatible connections (USB 2.0, 100 Mbit/s Ethernet and RS 232) tracing, logging and controlling the embedded software from a PC is a possible use case of MOCCA compact 2.3.

2.2.1 Feature Summary

The following list summarizes the key features of the hardware platform. Please note that some options may not be available in a specific configuration.

- 6 CAN® busses; two of them with selectable transceiver: high- or low-speed and high speed or single wire
- MOST25, MOST50 or MOST150
- 1 FlexRay (with channels A/B)
- USB 2.0 port supporting high speed
- Ethernet connection with 10/100 Mbit/s
- S/PDIF coaxial input and output for audio streaming over MOST®
- Relay to switch external loads of up to 5A
- 2 LIN® busses

2.2.2 System Overview

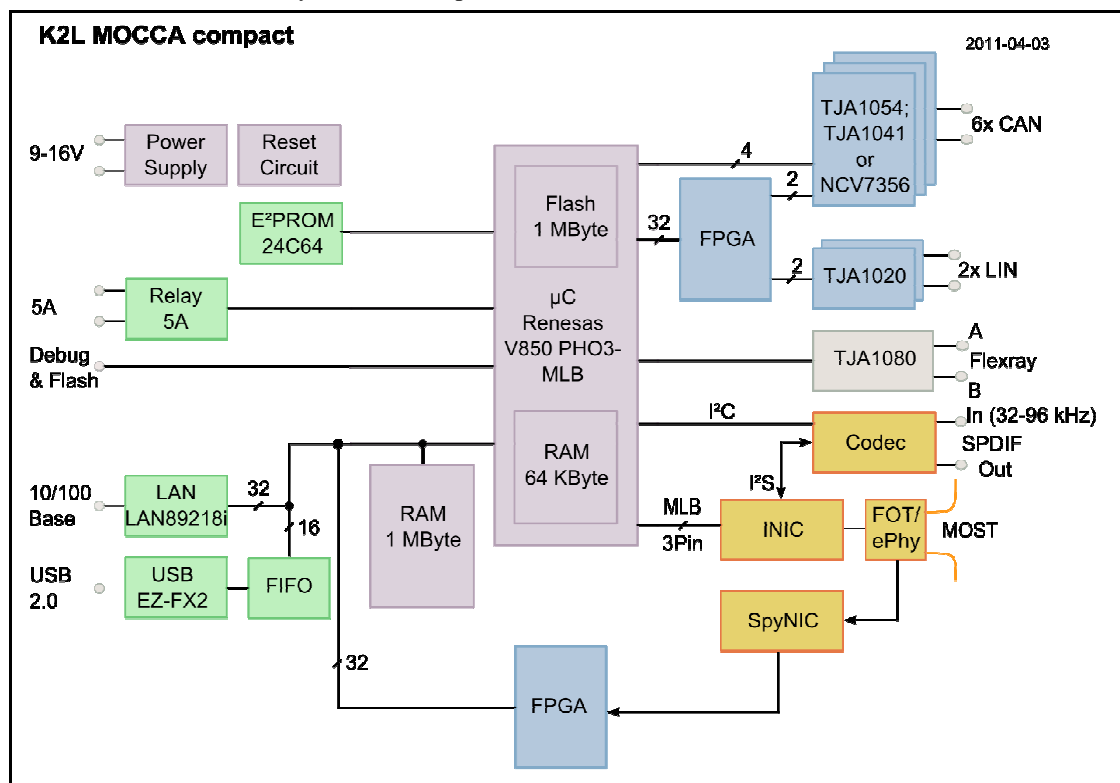Illustration 2-1 shows the system with all possible features.

Illustration 2-1: MOCCA compact 2.3 Block Diagram

2.3   Technical Specification

Table 1-2 summarizes the main technical attributes of the MOCCA compact 2.3.

Attribute	Value
µController (32 bit)	NEC V850E/PH03-MLB @128MHz
RAM	1 MB external
Flash	1 MB internal
Dimensions (H x W x D):	45 x 112 x 116 mm
Weight	ca. 360 g
Ambient Temperature Range	-40 .. +85 ℃
Operating Voltage Range	9 .. 16 V
Current Consumption (operation, typ.)	350 mA
Current Consumption (standby)	< 25 mA
Relay for external Load	Potential free shutter, max. 5A/12V DC
Low Speed CAN Transceiver	NXP TJA 1054
High Speed CAN Transceiver	NXP TJA 1041
Single Wire CAN Transceiver	OnSemi NCV7356
FlexRay Transceiver	NXP TJA 1080
LIN Transceiver	Texas Instruments SN65HVDA195
MOST Controller	MOST25 optical: SMSC OS81050 - or - MOST50 electrical: SMSC OS81082 - or - MOST150 optical: SMSC OS81110
MOST25 FOT	Tyco micro FOT (2+0)
MOST Interface	3 Pin MLB 512 FS
LAN	SMSC 89218, 10/100 Mbit/s
USB	Cypress EZ-USB 2.0
S/PDIF	I/O electrical via 2 x Cinch, input sample rate 32 – 96 kHz

Table 2-2: Technical Specification

3 Pin out of the Connectors

In the following sections the pinning of the different input output connecters are described. Please note that some signals may not be available on a specific hardware or software configuration.

3.1 Connectors on the Back

In the illustration below you can find annotations which indicate the table index which describes the respective connectors pinning.
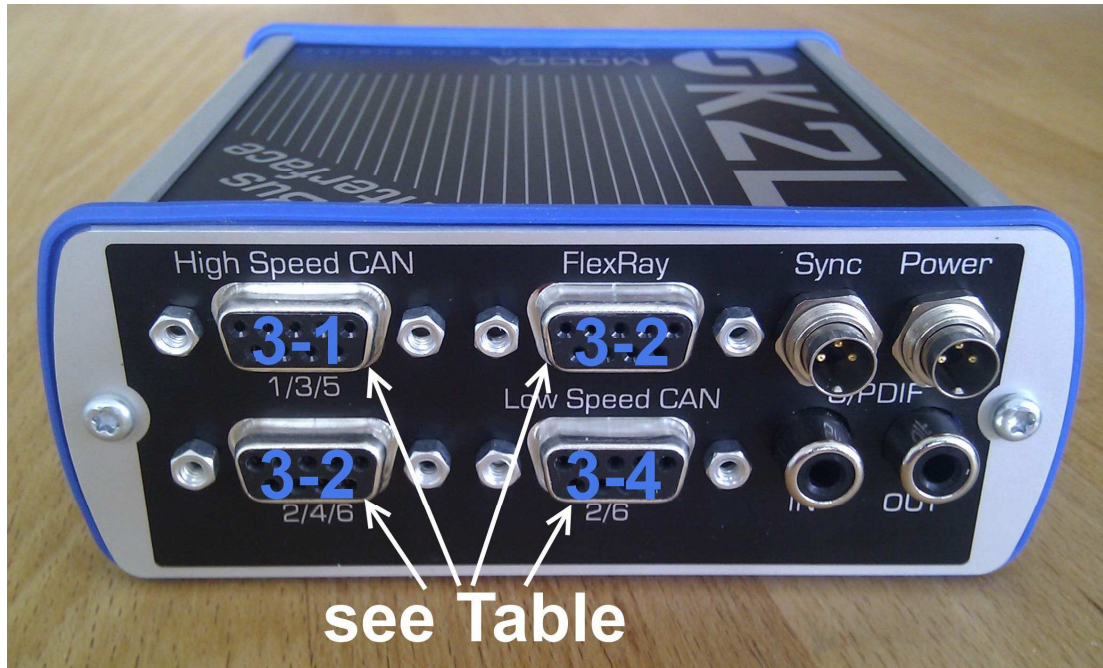
Illustration 3-1: Connectors seen from the supply side

3.1.1 High Speed CAN

The provided GND pins must not be used unless there is no other GND connection. These pins must not be used for supply purpose.

Pin No.	Signal	Description
1	CAN5-Low	LOW-level CAN bus line
2	CAN1-Low	LOW-level CAN bus line
3	GND	Signal ground
4	CAN3-Low	LOW-level CAN bus line
5	-	Not connected
6	-	Not connected
7	CAN1-High	HIGH-level CAN bus line
8	CAN5-High	HIGH-level CAN bus line
9	CAN3-High	HIGH-level CAN bus line

Table 3-1: Pinning of Connector High Speed CAN 1/3/5

Pin No.	Signal	Description
1	CAN6-Low	LOW-level CAN bus line
2	CAN2-Low	LOW-level CAN bus line
3	GND	Signal ground
4	CAN4-Low	LOW-level CAN bus line
5	-	Not connected
6	-	Not connected
7	CAN2-High	HIGH-level CAN bus line
8	CAN6-High	HIGH-level CAN bus line
9	CAN4-High	HIGH-level CAN bus line

Table 3-2: Pinning of Connector High Speed CAN 2/4/6

3.1.2 FlexRay

The provided GND pin must not be used unless there is no other GND connection. This pin must not be used for supply purpose.

Pin	Signal	Description
1	-	Not connected
2	Channel A BM	negative bus line
3	GND	Signal ground
4	Channel B BP	positive bus line
5	-	Not connected
6	-	Not connected
7	Channel A BP	positive bus line
8	Channel B BM	negative bus line
9	-	Not connected

Table 3-3: Pinning of Connector FR A/B

3.1.3 Low Speed CAN / LIN

One fault tolerant, one single wire CAN interfaces and two LIN channels are combined on this DE-9 socket.

The provided GND pin must not be used unless there is no other GND connection. This pin must not be used for supply purpose.

PIN no.	Signal	Description
1	LIN1	1st LIN Channel
2	CAN2-Low	LOW-level CAN bus line
3	GND	Signal ground
4	-	Do not connect
5	-	Do not connect
6	-	Do not connect
7	CAN2-High	HIGH-level CAN bus line
8	LIN2	2nd LIN Channel
9	CAN6-High	HIGH-level CAN bus line (single wire)

Table 3-4: Pinning of Connector Low Speed CAN 2/6

3.1.4 CAN Breakout Cable (optional Accessory)

Most wire harnesses connect only one CAN bus to each DE-9 connector. Usually they connect CAN-Low line to pin 2 and CAN-High line to pin 7. Pin 3 is usually GND.
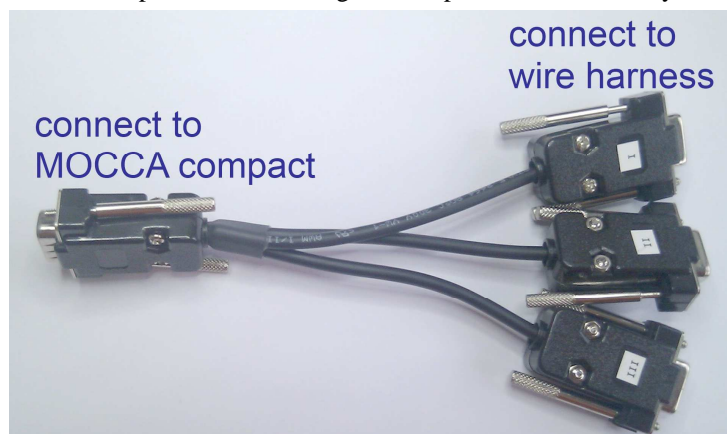
Illustration 3-2: CAN Breakout Cable - each of the Sockets I, II and III connect to one pair CAN-L/CAN-H from the MOCCA compact

The CAN breakout cable can be used to adapt from the compact pinning used on the MOCCA compact 2.3 (where up to 3 CAN are available on one DB-9) to three DB-9 sockets compliant to the standard pinning. The CAN bus with the lowest index on this connector on the MOCCA compact 2.3 is routed to the DB-9 socket with the marking "I" and the CAN bus with the next higher index on this connector is routed to the adapters' DB-9 socket with the marking "II" and so on.

If the adapter is used on the connector "High Speed CAN 1/3/5" for example the connection is as follows:

CAN no.	Socket
1 (High Speed)	I
3 (High Speed)	II
5 (High Speed)	III

3.1.5 Sync and Power

The Sync and the Power connector have the identical pinning i.e. the user may choose the socket which is most comfortable for him. Please see chapter 1 Safety instructions, too.
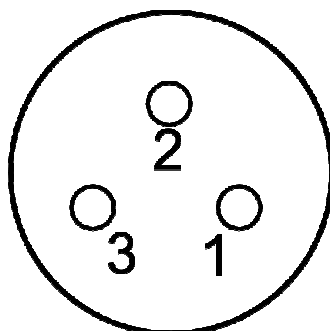
Illustration 3-3: Pin Numbering of the Sync/Power Connector seen from the user side

PIN no.	Signal	Description
1	12V	Supply
2	Sync	Synchronization Line
3	GND	System Ground

**Table 3-5: Pinning of the Sync/Power Connector**

The device is intended to be powered by the (optional available) wall power supply or by any other power supply which is capable to deliver 12V and 1A. If the wall power supply is not used the included power cable has to be used to connect the 12V supply with the device.

3.1.6 Digital Audio In/Out

The MOCCA compact 2.3 offers one digital audio input and one output. The output is compliant to the IEC60958 with 75Ω and 0.5Vpp. The output is short circuit proof.

The input circuit expects an unbalanced input and has an impedance of 75Ω. The shield connects to system ground. Input sample rates from 32 to 96 kHz are accepted.

Both interface to a RCA phono socket.
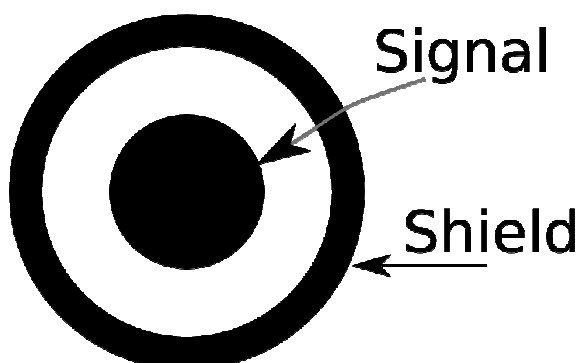
Illustration 3-4: RCA Phono Socket of the S/PDIF Input and Output

3.2 Connectors on the Front

Illustration 3-5: View on the Front

3.2.1 USB

The USB port is a standard USB B-type receptacle.

3.2.2 Relay

The relay is able to switch 5A as a potential free shutter. The two left pins and the two rights are internally connected. Please see chapter 1 Safety instructions, too.

PIN Number			
1	2	3	4
connected		connected	

Table 3-6: Pinning of the Relay Connector

3.2.3 MOST

The device supports three MOST speed grades from MOST25 oPhy over MOST50 ePhy to MOST150 oPhy.

For MOST25 and MOST150 the connector is a Tyco micro FOT (2+0). The orientation of the Rx and Tx path is printed on the panel.

For MOST50 a AMP 1376350-1 is used. The pinning is as follows:

Pin	Description
1,4,5,8	**Not connected**
2	**ETXP**
3	**ETXN**
6	**ERXN**
7	**ERXP**

Table 3-7: Pinning of ePhy Connector for MOST50

3.2.4 LAN

The LAN connector is a RJ45 receptacle according to TIA-568.

3.2.5 LEDs

The MOCCA compact 2.3 offers seven LED-positions where UD1..UD4 and Operation are dual color positions.

LED Position	Red	Green
Active		**X**
Operation	**X**	**X**
UD1	**X**	**X**
UD2	**X**	**X**
UD3	**X**	**X**
UD4	**X**	**X**
I/0		**X**

Table 3-8: LED Operation Modes

The meaning of the different indications is dependent on the firmware. The "I/0"-LED always indicates a powered device.

3.2.6 Reset

The device can be reset by the pushbutton on the front. If the button is pressed for less than 1s the device is reset.

The same button is used to enter the flashing mode. For details see the "K2L Flasher Online Help" of the K2L Flasher distribution.

4 Termination of Field Busses

The MOCCA compact 2.3 is intended to be used as stimulation and test device for automotive field busses and DUTs connected to them. Following this intention the design is constrained to ensure a behavior as passive as possible.

4.1 CAN

4.1.1 High Speed Transceiver

As high speed CAN-transceiver a TJA1041 from NXP is used. High speed CAN-busses according to ISO 11898-2 are terminated with 120 Ω at each end. Therefore MOCCA compact 2.3 does not terminate the bus.

Termination resistors can be ordered separately from K2L.

4.1.2 Fault Tolerant Transceiver

As fault tolerant CAN-transceiver a TJA1054 from NXP is used. Fault tolerant CAN-busses usually have a distributed termination. The value of the termination in each node depends on the number of nodes in the network. To avoid effects on the total impendence of the network the MOCCA compact 2.3 has a weak termination of 5k6 Ω.

4.1.3 Single Wire Transceiver

The single wire CAN is terminated with 9k1 Ω.

4.2 FlexRay

The termination of a FlexRay bus depends on the bus topology. In each active branch there have to be two terminations. The MOCCA compact 2.3 can be installed in various topologies. Hence a termination in the device is not foreseen.